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WHILE the broad lines separating measles and scarlatina are universally recognized, there has been anything but harmony among writers concerning certain anomalous forms of eruptive fever prevailing from time to time which present mingled characters of the two affections, or which appear to present the features of an independent affection. Ever since the middle of the last century, they have attracted much attention, and while, for the most part, they have been considered as aberrant forms of measles or scarlatina, there can be noticed a constantly recurring disposition to gather together, under a special designation, certain cases prevailing sporadically or epidemically, which seemed to offer peculiarities distinguishing them from these two diseases. According to Emminghaus, de Bergen (*de roseolis*), in 1752, was in favor of separating rötheln from scarlatina and measles.[2] Selle, in 1780, declared rötheln to be an independent affection. The question was discussed by various writers, among whom were Zeigler (1788), Thompson (Edinburgh, 1800), Fleisch (1804), Strohmyer, and others. They all, however, described dangerous affections which seem to have been abnormal forms of scarla-

[1] Read at the tenth annual meeting of the American Dermatological Association, August 26, 1886.

[2] I am indebted to the articles of Emminghaus (Jahrb. f. Kinderheilk., 1870-71, N. F 4, S 47, and Gerhardt's Handbuch f. Kinderkr., 1877, B. 2, S. 336), and of Klaatsch (Zeitsch. f. klin. Med., 1885 10, 1), for most of my historical references.

tina, but which differed widely in their symptomatology. In Hufeland and Henle's *Journal* (1812) Heim wrote concerning "the difference between scarlatina, rötheln, and measles." Willan, in his account of *rubeola sine catarrho*, observed that it did not protect from measles. Bateman made it a variety of this disorder, but Maton, in 1815, recognized its independent nature (Squire). In 1818, however, Henle pronounced rötheln a variety of scarlatina.

A number of writers now successively described epidemics of benign macular eruptions, neither measles nor scarlatina, which did not afford protection from these diseases, attacking all alike, but which nearly always appeared when measles or scarlet fever prevailed, or had preceded or followed by short intervals, in localities proximate to where these exanthems were to be found. In 1822, Schönlein, for example, noted that in the "Rheinprovinz" measles was rife, beyond the Elbe, scarlet fever, and between these two districts, rötheln. G. v. d. Busche described an epidemic (1841) beginning with measles, at the height of which rötheln appeared, and when this reached its acme scarlatina became active. Gertsema, in Groningen, in 1821, and again in 1834, had seen similar epidemics; likewise Wagner and Paasch (1854). Schönlein had tried to harmonize the discordant opinions by regarding rötheln as a disease in which the relations between the skin and mucous membrane were such that when scarlatinal symptoms developed upon the skin the mucous membrane showed those of measles, and *vice versâ*.

Gradually, all affections having a red macular eruption and not recognizable as measles or scarlatina, came to be described as rötheln, and great confusion resulted. Some writers, even, were induced to fall back upon the old teaching of the identity of measles and scarlatina. The identity of rötheln seemed quite disproved, especially when Hebra entirely discredited its specific existence, and Wunderlich spoke of rötheln as a synonym for measles. Gelmo,[1] having observed anomalous epidemics in Vienna in 1848, 1851, and 1857, of which the features were most perplexing, concluded that, although eruptive forms, characteristic neither of measles nor of scarlatina, develop during the transitions of epidemics of measles and scarlatina, epidemics of one or the other of these affections grew out of them always; that isolated cases, anomalies of scarlatina or measles, could not justify the establishment of a separate species; and that, finally, no grounds existed for considering rötheln a distinct disease. Kostlein,[2] as late as 1865, held rötheln to be a variety of measles.

Balfour,[3] however, in 1857, regarded rötheln as a special disease, and in 1864 Grove[4] and Thierfelder[5] wrote of it. Veale[6] in 1866,

[1] Jahrb. f. Kinderheilk., Wien, 1858, Bd. 1, 152.
[2] Wiener med. Presse, 1868, 13
[3] Edinb. Med. Journ., 1857, p. 718.
[4] Lancet, 1864, 566 *et seq.*
[5] Greifswald Medicinische Beiträge, 1864, Bd. ii.
[6] Edinb. Med. Journ., Nov. 1866.

Schwarz[1] in 1868, Oesterreich[2] in the same year, Mettenheimer,[3] Steiner,[4] and especially Thomas[5] in 1869, and Emminghaus[6] in 1870, rapidly followed in a series of able articles that forthwith rescued rötheln from the oblivion in which previous writers had threatened to overwhelm it. In 1870 Murchison[7] contributed an article upon this subject, since which time many British physicians have devoted attention to it. Among them may be noted Fox,[8] Liveing,[9] Cheadle,[10] Squire,[11] and Tonge-Smith.[12] In France, until recently, rötheln attracted little attention. Bourneville and Bricon,[13] it is true, claim that it had long been recognized. Trousseau[14] regarded it as a distinct affection. It has also been considered by Trastour, Longuet, Lubanski,[15] and others. In America, though it is said to have been described by Homans, Sr., in 1845, and by Cotting in 1853 and 1871,[16] it is to the pen of J. Lewis Smith[17] that we owe the first systematic notice of the disease.

A large number of communications have lately appeared in the journals, adding materially to the sum of our knowledge of the disease. The excellent article by Hardaway in Pepper's *System of Medicine* is especially to be commended. Edwards's valuable paper in the AMERICAN JOURNAL OF THE MEDICAL SCIENCES[18] gives an extensive bibliography of American writers upon rötheln. Important contributions have also been made by Duhring, Park, Hatfield, Harrison, and others.

Thus the "rötheln question" has only within twenty years assumed a phase that gives hope of its satisfactory solution. The recent stimulus given it, however, threatens again to relegate it to the domain of medical conundrums; for, while earlier writers were disposed to deny that rötheln was anything but aberrant measles or scarlatina, the recent tendency is to assign to it all anomalous cases and epidemics that resemble but do not correspond with these affections. Doubtless many of these are aberrant forms, or, possibly, combinations of measles and scarlatina. The study of rötheln is thus rapidly becoming obscured by fantastic and motley embellishments, and there is reason to fear that the resulting confusion will reawaken the early scepticism concerning it.

DEFINITION.—Rötheln (synonyms: German measles; rubeola; rubeola notha; rubeolo sine catarrho; roseola epidemica, etc.) is a specific, exanthematic, contagious disorder, characterized by a period of incubation lasting usually from two to three weeks; a prodromal period varying

1 Wiener med. Presse, 1868, 13.
2 Inaug. Dissert., Leipzig, 1868.
3 Journ. f. Kinderkr., 1869, 53.
4 Archiv f. Dermatol. u. Syph., 1869, 237.
5 Jahrb. f. Kinderh., 5 Jahrg.
6 Ibid., 1870–71, N. F. 4, p. 47.
7 Lancet, 1870, 595.
8 Med. Times, London, 1870, 360.
9 Lancet, 1874, 360.
10 Trans. Internat. M. Cong., Lond., 1881, iv.
11 Ibid.
12 Lncet, 1883, 994.
13 Le Prog. Méd., xii. 578.
14 Clinical Lectures.
15 Union Médicale, 1884, No. 7 *et seq.*
16 Boston Med and Surg. Journ., 1873; and Trans. Internat. M. Cong., London, 1881.
17 Archives of Dermatology, vol. i.
18 October, 1884.

from a scarcely appreciable interval to one day, less commonly two, and very rarely several days; and an eruptive period in which there is an exanthem closely resembling that of measles. A period of desquamation is in most cases wanting, and when present is but feebly developed. During the attack, and frequently preceding the eruption, there occurs almost constantly an enlargement of the cervical, submaxillary, auricular, suboccipital, and sometimes of other glands, which is often painful, but never suppurative. Catarrhal symptoms are absent or but slightly marked. A faucial hyperæmia is almost constant, but is rarely accompanied by pain. Throughout the attack fever is absent in about half of the cases, and when present rarely endures to the end of the second day or exceeds 39° C. (102.2° F.). The attack seldom lasts longer than three or four days, and the patient rarely keeps to his bed. The affection may prevail sporadically or epidemically, and is contagious, though to a less degree than measles. One attack usually confers immunity from subsequent ones, but does not protect from measles or scarlatina, nor do these exanthems confer immunity from rötheln. Children are usually affected, though adults have no special insusceptibility.

Etiology—Contagion.—Rötheln never occurs spontaneously, but is not violently contagious—far less so than measles. Steiner,[1] whose conceptions of its characteristics are especially definite, denies that it is at all contagious. V. Nymann[2] asserts that its contagiousness is almost *nil.* Klaatsch[3] considers it not very active. Only one-half in a school of sixty scholars were attacked (Veale). Park[4] noted that only two-thirds of those exposed to it were attacked.

Tonge-Smith[5] regards rötheln as having a not very intense contagiousness, lasting not longer than a week. Thierfelder thought it most contagious during convalescence, and Squire considers it contagious even before the rash and for two or three weeks afterward. While nearly all writers admit its contagiousness, it must be admitted that as yet we know little about the period when the contagion is most active.

Age and Sex.—Rötheln attacks the sexes indifferently. Of 331 cases gathered from various sources, 151 were males and 180 females. The difference here is probably accidental. Infants are not often attacked, though Sholl[6] reports a case of an infant a few days old, and Roth one of six months. Steiner saw it in a child of eight months. Lewis Smith also had infants among his patients. Seventy-two per cent. of all his cases were between the ages of two and ten years. Tonge-Smith's cases included, in a total of 145, 132 more than fifteen years old. Most observers report adult cases; Seitz[7] has recorded it in a woman seventy-

[1] Archiv f. Dermatol. u. Syph., 1869, 237.
[2] Oesterreich, Jahrb. f. Pædiat., N. F. iv. Bd. 2, 123.
[3] Zeitschr. f. klin. Med., 1885, 10, 1.
[4] Chicago Med. Journ. and Exam., 1881, xlii. 130.
[5] Lancet, 1883, 994.
[6] Transact Med. Soc. Alabama, 1881.
[7] Ziemssen's Cyclop.

three years old. These variations show that the time at which rötheln is most apt to occur is not a question of years, but of exposure and protection. Most reports come from asylums and children's hospitals, where but few adults are exposed. Adults unprotected by attacks of rötheln during childhood probably enjoy no immunity. Kassowitz,[1] however, noted but five adults among his sixty-four cases in private practice.

Relation to other Eruptive Fevers.—It has been urged against the specific identity of rötheln that it tends to prevail with or immediately before or after epidemics of scarlatina or measles. This tendency was especially noted by earlier writers, whose descriptions suggest that they had reference to anomalous forms of measles or scarlatina, quite as often as to rötheln. The same tendency, however, has been observed by those who entertain definite views of the nature of rötheln; but as rötheln is observed quite independently of prevailing epidemics of either of these diseases, it seems probable that these are coincidences without significance, and have an analogue in similar coincident prevalence of other eruptive fevers. It is a point of the greatest importance, however, that, although rötheln often closely corresponds in point of time with measles or scarlatina, the diseases are not mutually protective. Those who have had the latter affections are as susceptible of rötheln as those who have not, and an attack of the last named disorder in no wise lessens the liability to either of the former. This is universally admitted. Of Steiner's 21 cases, 6 had had scarlet fever and measles, and 7 had had measles alone; of Thomas's 23 cases, 12 had had measles, and 3 scarlatina; of 48 cases recorded by Lewis Smith, 19 had had measles, and 1 contracted measles one month subsequently. Dukes[2] noted 63 cases in 1877, of which 39 had had measles, and 25 cases in 1878, of whom 22 had had measles. Of 19 cases under the observation of Roth,[3] 7 had had measles within seven or eight weeks; and Rott[4] reported 17 cases, of which 16 had already had measles. Of Veale's 30 cases, 13 had had measles. Shuttleworth[5] noted that of his 31 cases, 11 had already had measles, and 7 measles and scarlatina. Subsequently 2 of these patients had measles, 5 measles and scarlatina, and 2 scarlatina only. Most of Parks's 100 cases had had measles during the previous winter or spring. There is thus abundant evidence that no immunity is afforded by an attack of rötheln against measles and scarlatina, and *vice versâ*. Indeed, the second malady sometimes follows closely upon the heels of the first.

Incubation.—This is longer than is usual with the exanthemata, though wide variations are observed. Robinson[6] determined in his cases

[1] Trans. Internat. Med. Cong, London, 1881, iv. p. 10.
[2] Lancet, 1881, 745. Deutsch. Archiv f. klin. Med., 14, 539.
[4] Aertzl. Intelligenz-Blatt, 1879, x. p. 101.
[5] Transact. Internat. Med. Cong., London, 1881, iv. [6] Medical Times and Gazette, 1880.

a period of 6 to 7 days. Bristowe[1] considers incubation to last 1 week; Edwards[2] about 10 days (shortest incubation 6 days, the longest 21 days); Lewis Smith, from 7 to 21 days; Squire, from 14 days to 3 weeks; Tonge-Smith in 10 cases noted an incubation of 14 days; Dukes, in 36 cases, from 12 to 22 days. Roth estimates it at 18 to 19 days. Klaatsch[3] has noted a period of 14 days often, also of 17 to 22 days, and sometimes more than 4 weeks. Thomas[4] places it from 2½ to 3 weeks, probably never longer, never less. Emminghaus[5] definitely determined the incubation in most of his cases to be 18 days; in some 14 days, in others as much as 20 days. Veale's cases had an incubation of 12 days. In a series of 30 cases, Balfour noted 14 days as the incubative period; Duckworth[6] placed it at 16 days; Jacobi,[7] at 14 to 21 days. A comparison of these figures shows the incubative period of rötheln more often to exceed than to fall short of 14 days. Some writers place it, definitely, at 18 to 21 days, but general experience appears not to justify such rigid limits. For the present, therefore, we place the incubative period of rötheln at from 14 to 21 days, sometimes less, rarely more.

Period of Invasion. Prodromal Stage.—In many cases, no appreciable prodromal stage is present, the eruption giving the first intimation of disorder. As this is usually observed in the morning, just after the night's rest, it is probable that brief prodromes may have occurred during sleep. Occasionally, prodromes may really be absent, but in the great majority of cases symptoms of slight intensity may be observed from a half to one day before the eruption appears; rarely prodromata last for several days. Steiner has asserted that there is no prodromal stage. Klaatsch and v. Nymann state that the eruption usually appears without prodromes; the latter rarely observed an initial chill 1 or 2 days before the eruption. Thomas asserted that this stage lasts from two hours to a half day at most. Rott observed a prodromal stage of from a half to 1 day; Roth, of from a half to 3 days. Veale's cases showed the eruption on the first day. While Emminghaus often observed no prodromes, he, with Mettenheimer and Thierfelder usually noted them from 1 to 3 days preceding the eruption. Lewis Smith observed them some hours, or a day or even longer; Parks saw no definite premonitory symptoms. Squire saw the eruption on the first day. In Edwards's cases, the average was 3 days; in Hemming's, from a few hours to 3, 4, even 5 days; in Cheadle's, from 2 to 3 days.

These observations show that rötheln is either without a prodromal stage or has one not exceeding 24 hours in most cases. This characteristic at once stamps the disease with a specific feature. The premonitory

[1] Practice of Medicine.
[2] Zeitschr. f. klin. Med., 1885, 10, 1.
[3] Loc cit.
[4] Jahrb. f. Kinderheilk., 5 Jahrg., 4 H.
[5] Gerhardt's Handbuch f. Kinderkr., B. 2.
[6] Lancet, 1880.
[7] Transactions American Medical Association, 1881.

symptoms are usually limited to slight malaise, with headache, joint pains, giddiness, faintness, anorexia, and rarely nausea and vomiting; very exceptionally convulsions are noted (Smith, Lindwurm, Edwards). Shivering and an initial chill[1] may begin the attack. Smarting of the eyes and slight photophobia may occur, but beyond conjunctival injection, catarrhal symptoms are generally absent; sneezing, snuffling, cough, and hoarseness, and even croupy attacks (Balfour) may develop. The tongue is slightly coated with a dull, whitish fur. Often at this stage mild pharyngeal distress is experienced and the fauces show a diffused or a maculated hyperæmia.

A common symptom of this stage is the adenopathy characteristic of the stage of eruption, involving the occipital, posterior, and anterior auricular, submaxillary, cervical, and often other glands. These become enlarged to the size of coffee-grains or larger, are tender, and may occasion swelling and stiffness of the neck. This may be the most striking symptom of this stage and may attract attention several days before the eruption appears. It is, however, not constant. In many cases fever is absent. Very often it is present to a slight extent and may subside before the beginning of the eruption (Emminghaus). In 20.1 per cent. of v. Nymann's cases it lasted only 24 hours, but was absent altogether throughout the attack in 48.73 per cent. All of Emminghaus's cases began with fever, rarely exceeding 38.5° C. (101.3° F.), and rarely reaching this point. When prodromes were prolonged into the second day, this writer noted a morning remission passing into an exacerbation as the eruption appeared. Edwards observed epistaxis among the prodromes, three times. This author thought that the prodromal symptoms increased in severity until the eruption appeared; but it is to be noted that the intensity of these symptoms bears no fixed relation to the severity of the subsequent course of the disease. Characteristic of rötheln, however, is the short duration or entire absence of febrile symptoms previous to the appearance of the eruption.[2]

Stage of Eruption.—Very often the patient is unconscious of his attack until accident reveals the eruption. In the great majority of cases upon awakening in the morning he feels unwell, and discovers the eruption upon examining his body at once, or after a brief prodromal period. It usually appears first upon the forehead and temples, rapidly extending over the face and neck, in a few hours spreads to the trunk, and thence to the upper and lower limbs. It becomes visible as pale pinkish-red macules of minute size. A faintly reddened condition of the parts first invaded may precede the exanthem. Emminghaus noted a ring of efflorescence around the neck sending prolongations between the scapulæ and over the breast between the nipples. Exceptionally the eruption

[1] Initial chill was observed in 15.46 per cent. of v Nymann's cases.

[2] Duckworth, Lancet, 1874, 1, p. 360.

may bloom out at once over the whole surface, but almost always it attains its maximum upon different parts unequally and in the order of evolution. Upon the trunk and extremities the lesions may be at their height, while upon the head and neck they may have almost disappeared, or the reverse may occur when, as rarely happens,[1] the latter parts are last invaded. It is so fugaceous, that by this maximum intensity in different parts it affords a striking contrast with what occurs in measles usually. This evanescence has probably served to foster Heim's erroneous theory of "a local rötheln."

The eruption of rötheln is by no means uniform, and a recognition of this fact is essential to a correct appreciation of the affection. Various eruptive types have been described, for convenience, but almost invariably a more or less irregular development is observed. It is in the mildest and afebrile cases that the eruption becomes most characteristic. It then acquires a punctate appearance and a pale rose color. At first the spots do not contrast markedly with the unaffected portions of the skin, but soon they acquire a brighter color and more definiteness. They have a rounded appearance, and are not grouped into crescentic shapes, as in measles. They vary from pin-head to hemp-seed size and larger, and have been compared by Paterson, of Leith, and Heim to the effect obtained by touching white blotting-paper with a pen charged with red ink. Their color, however, is not so brilliant and their outline by no means so regularly circular as the comparison would indicate.

In mild cases they may remain isolated almost throughout. Here and there they become confluent, and in more pronounced cases confluence is frequently observed. There is always some, and sometimes marked elevation of the lesions, but the papules remain soft. By a strong and oblique light the irregular elevations may be plainly seen. The lesions are sometimes larger. They are then apt to lose the circular outline, and may be twice the size of the smaller lesions. Each spot is surrounded by an areola, and is more vividly colored toward the centre in consequence. The eruption is most abundant on the face, chest, nates, and often on the arms, forearms, and flexor surface of the thighs. The color is most vivid above, but is often intensified by the warmth of the clothing. The patches often increase in area and coalesce, and may then simulate the rash of scarlatina. The original lesions may be distinguished by pressing the surface firmly with the finger, when they will be seen to become less anæmic under the pressure than the surrounding parts (Heim). Large plaques of continuous eruption differ from the scarlatinal efflorescence in being paler, and in never prevailing to such a degree that the predominating maculo-papular character is not shown in parts less extensively invaded. They may often involve the flexor

[1] Tonge-Smith.

surfaces of the forearms. Often the eruption resembles that of mild measles so much that the candid observer cannot distinguish it. However, it almost never assumes the dark raspberry coloration of this affection. Dunlap has observed petechial lesions, but these are most rare.

The eruption attains its full development in a few hours, and very often fades before the second day. As it fades, it assumes a duller pinkish-brown color, which is gradually replaced by a pale pigmentation, which may last several days. As the confluent eruption acquires this coloration, a striking appearance of marbling results by contrast with the unaffected skin, a condition noted by a number of writers. Not very uncommonly many of the maculo-papules become tipped with vesicles or vesico-pustules (Hardaway, Klaatsch, Edwards, Thomas). These are small, and acuminate and desiccate early. From the beginning to the final disappearance of the eruption the usual period is from three to four days. In v. Nymann's cases it had a duration of—

1 day	in 10 cases	=	8.40 per cent.
2 days	in 29 "	=	24.36 "
3 "	31 "	=	26.65 "
4 "	" 33 "	=	27.73 "
5 "	" 12 "	=	10.08 "
6 "	" 3 "	=	2.52 "
7 "	" 1 "	=	0.55 "

A more protracted eruptive stage has been noted (Liveing, 8–10 days; Edwards, 15 days). It is probable, however, that such cases are examples of unusually intense and persistent pigmentation following the hyperæmia. Though the eruption lasts two, three, or four days altogether, it is very transitory on the different parts, not often remaining more than twenty-four hours in any one locality; thus, it has frequently faded from the face when in full bloom upon the trunk, and before it had developed upon the extremities. It is important to remember that the cases with most marked general symptoms are not always those in which the eruption is most intense and persistent. The rash is not commonly attended by itching; a slight tingling or burning sensation is at most complained of.

While the eruption undergoes its development, other important symptoms appear. We have seen that fever may be absent throughout. Most patients, however, exhibit a slight rise of temperature. In a few, this has already fallen to normal when the eruption appears. In most the acme of fever corresponds, not to a period of free efflorescence, but is observed during the first day.[1] In Reid's observations, quoted by Smith, the temperature ranged in 17 cases from 97° F. to 99° F., and in 6 cases from 100° F. to 100¼° F., and in only 1 case reached 103¼° F.

[1] E. Long Fox, however, declares that the highest temperature usually corresponds with the maximum eruption.

(on the second day). According to Tonge-Smith, the temperature rarely exceeds 100° F. Edwards observed a common rise of from 1° F. to 3° F.; rarely it reached 103°–104° F. Hemming rarely saw it exceed 101° F. While Roth considers absence of fever the characteristic condition, he has seen a temperature of 38.3° C. (100.9° F.). In only 2 of v. Nymann's 119 cases was 39.5° C. (103.1° F.) indicated. Only one-half of Klaatsch's cases had fever, and they only during one day (38° C., seldom 39° C. (100.4°–102.2° F.) in the axilla). All of Emminghaus's cases had fever, seldom exceeding 1.5° C. (2.7° F.) rise, and rarely attaining it. In Kassowitz's cases an elevation of 1.5°–1.8° C. (2.7°–3.2° F.) in the axilla was constantly observed. In all cases efflorescence was complete on the second or third day. Rott observed no fever except in complicated cases. On the other hand, high temperature was noted by E. Long Fox (103° F.), Robinson (103°–104° F.), Edwards, and others. It may be stated, as a rule, that the temperature in rötheln does not exceed 100° F. Slight exacerbations of fractions of a degree may be recorded as the parts are successively invaded by the eruption, but, upon the whole, rapid defervescence follows, the normal being reached, except after complications, before the completion of the eruption.

Conjunctival hyperæmia, usually developed in the prodromal stage, when such is present, persists with a sense of smarting during the attack. Lachrymation and photophobia are uncommon. Nasal, buccal, laryngeal, tracheal, and bronchial catarrh are absent, as a rule, in milder cases. At other times there is mild catarrh of these surfaces (Thomas). Lewis Smith noticed catarrh of the nasal, buccal, and faucial, but not of the laryngeal, tracheal, or bronchial mucous membrane. Park observed bronchial irritation in about ten per cent. of his cases with conjunctival suffusion, and had he not known that the same children had had measles, he would have been tempted to diagnosticate these cases as such. It may be concluded that although absence of catarrhal inflammation cannot be regarded as typical of rötheln, this complication is vastly less pronounced than with measles, and affords a striking contrast between these affections. The faucial mucous membrane, however, is almost constantly implicated in rötheln. Nearly all writers have observed this. Schwarz[1] thought he had established a diagnostic point between rötheln and measles in indicating in the latter affection upon the faucial mucous membrane, pinhead to hempseed and lentil-sized spots, discrete and reddish, but at times confluent and irregular, which are not seldom observed before the eruption. This undoubtedly holds for measles, but it is valueless for diagnosis, for the throat eruption of rötheln often exactly resembles that of measles. It is true, the usual appearance of the fauces in rötheln is of a diffuse redness, like that or

[1] Wiener med. Presse, 1868, ix. 302.

mild pharyngeal catarrh, or of mild scarlatina. This is unaccompanied by much swelling or difficulty of deglutition; there may, indeed, be no subjective faucial symptoms. But quite as often, this eruption is like that of measles,[1] or the throat may have a streaked appearance. The redness extends to the palate, throat, tonsils, and larynx, but hardly ever exceeds simple hyperæmia. Lewis Smith, however, has seen mild diphtheritic inflammation. While the faucial efflorescence cannot be considered essentially different from that of measles, it is sufficiently marked to constitute a characteristic symptom of rötheln. Usually very transitory, it may persist after the subsidence of the eruption. It is more often diffuse than macular. Faucial redness was absent in only 11 of v. Nymann's cases. It disappears almost invariably by the fourth day of the disease.[2]

The digestive tract remains about as in the stage of prodromes. The tongue is rather coated, often showing a few red papillæ toward the tip. In severe cases it may become dry and brownish. The appetite and digestion are frequently hardly impaired. When fever is at all marked, the digestive tract may suffer in proportion to the degree of derangement incident to the febrile condition. A very remarkable adenopathy gives rötheln one of its most distinctive symptoms. This often precedes the eruption; more often it appears as this develops, and consists in a painful but never suppurative enlargement of the cervical, submaxillary, anterior and posterior auricular and occipital glands. The enlargement of these glands, with the eruption, often gives the patient a swollen, bloated appearance, and occasions troublesome "stiffness of the neck." Occasionally, the axillary, epitrochlear, inguinal, and popliteal glands are also enlarged (Tonge-Smith, Klaatsch). Trastour attributes to Bloch, of Denmark, the first description of this adenopathy. Klaatsch declares it so constant, that, in the dark, with the knowledge that an acute exanthem was present, the diagnosis of rötheln can be made from it alone. Hardaway has never found it absent. It appears to vary, however, in the constancy of its occurrence in different epidemics. Park saw it in about fifty per cent. of his cases; Kassowitz, in about thirty-three per cent.; Emminghaus noted its frequent occurrence. Thomas believes it to be frequent but by no means constant. V. Nymann, however, did not observe it in his cases. Its usual presence is almost universally admitted. It must not be forgotten, however, that similar adenopathies are sometimes seen in measles. Its extent is not at all proportionate to the character and intensity of concomitant symptoms. Not rarely it is the first and only symptom to attract the patient's attention. It may not be amiss to suggest here that some of the peculiar,

[1] Löri, Jahrb. f. Kinderheilk., 1882-83, N. F. xix.

[2] Tonge-Smith observed secondary sore throat on the fourth or fifth day.

acute, and transitory multiple glandular enlargements about the head and neck, without eruption but with mild fever and tenderness, that sometimes prevail extensively, the etiological relations of which have eluded identification, *may* depend upon rötheln. The glands speedily lose their sensitiveness and diminish in size.

Kingsley, Harrison, Duckworth, and Edwards have reported albuminuria as occurring during the attack. The latter writer noticed it in thirty per cent. of his cases. In nine it was pronounced and accompanied by dropsy. Such observations are altogether exceptional and were probably due to local influences. Emminghaus observed slight albuminuria in one case. In two of five cases Duckworth observed transitory albuminuria. Most observers have never seen it complicate rötheln.

In many cases the eruption fades and leaves no trace. It is a peculiar feature of rötheln that, probably in the greater number of cases, desquamation fails to occur. This is not to be ascribed to any inherent property of the affection, but is due to the trivial degree of hyperæmia usually experienced. After more intense efflorescence, desquamation undoubtedly occurs, though so scantily that careful observation is often required to detect it. Steiner asserts, indeed, that there is no desquamation; Oesterreich, that it is almost absent; Squire, that there is almost none; Roth, that it is exceedingly uncommon; Robinson, that it is slight, and is imperceptible in mild cases; v. Nymann, that there is none; Emminghaus, that there is no notable desquamation, but that in most cases a slight furfuraceous scaling exists. Wagner, de Man, Balfour, Thierfelder, Mettenheimer, Lindwurm, Veale, and Arnold hold similar views. Henning noted more or less branny desquamation lasting five to twelve or fifteen days. Trastour describes it as furfuraceous, as also does Edwards. Hardaway states that a fine desquamation follows, but by no means invariably. It becomes evident that the usual absence of desquamation does not partake of the nature of a peculiar feature of the disease. When present, it is most commonly observed in depressed areas of the surface, as behind the clavicles or parts but little exposed to friction. Nearly all patients remain up and about the house during the attack and convalesce at once. The persistence of fever after the fourth day, or its recrudescence, should arouse apprehensions of complications.

Complications and Sequelæ are not unknown. The possible occurrence of nephritic trouble has already been noticed. The most common complications are exaggerations of the catarrhal disorders, bronchitis, pneumonia, gastro-intestinal inflammation. Numerous other complications have been recorded, but may generally be considered rather as accidents than as having specific dependence upon rötheln. Klaatsch quotes Kronenberg as reporting four deaths from bronchitis, pneumonia, and cerebral congestion after rötheln. Rott observed that mumps frequently

followed the exanthem in from three to five days. Edwards observed enteritis and thrush in his cases. Slight œdema (face and legs) and even general dropsy have been known to follow. Hardaway has seen otorrhœa and ciliary blepharitis. Nasal and buccal catarrh may constitute sequelæ. Very rarely, relapses of rötheln are observed. They occur immediately or after several days, not later than a fortnight. (Emminghaus.)

Pathological Anatomy.—The usually trivial character of the disease has not tended to awaken especial interest in its pathology or to afford opportunities to study its lesions. Thomas states, in a general way, that the eruption is due "to capillary hyperæmia of the papillary body and of the uppermost layers of the corium; this can give rise to slight inflammation and exudation between the uppermost stratum of the corium and the epidermis, but it only occurs exceptionally in a few cases and then only on single parts of the body, and involving only a minority of the spots."[1] Nothing is known of the specific principle of rötheln.

Prognosis.—This is almost invariably favorable: Tonge-Smith reported no deaths in 145 cases; Park, none in 100 cases. Thomas says the prognosis is "thoroughly favorable." V. Nymann, Steiner, Oesterreich, Emminghaus, Hardaway, Robinson, and, indeed, nearly all writers agree that it is the mildest of the exanthemata.

Diagnosis.—The differential diagnosis of rötheln is not difficult except as regards measles. Here, however, it is most obscure, and can only be made with satisfaction after consideration of all concomitant circumstances. Speaking generally, broad rules may be established and relied upon as pretty constantly correct. When, however, the diagnosis has to be made for the individual and isolated case, it must be admitted that we have no positive and characteristic signs for rötheln; but the typical course of the affection markedly differs from that of measles, as is shown in the following table:

Rötheln.	Measles.
Contagiousness.	
Feebly contagious.	Violently contagious.
Incubative Stage.	
Usually from fourteen to twenty-one days. Often, however, less, but hardly ever less than one week. Rarely longer than twenty-one days.	Usually from nine to ten days. It may be only seven days or as much as eleven or twelve days. Very rarely less or more than these extremes.
Prodromal Stage.	
Very often none. Usually from one-half to two days. May be prolonged in rare cases to three, four, or even five days.	The eruption usually appears on the fourth day, sometimes earlier, rarely later.

[1] Ziemssen's Cyclopædia, vol. ii: p. 137.

Rötheln.	Measles.
Catarrh.	
Frequently absent or limited to slight conjunctival hyperæmia. Nasal, faucial, and bronchial irritation rarely pronounced.	Almost invariably present, affecting conjunctiva and respiratory passages. May be slight, but usually much more severe in mild cases of measles than in severe cases of rötheln.
Lymphatic System.	
Painful enlargement of occipital, auricular, cervical, submaxillary, and occasionally of other glands; quite constant during eruptive and frequent during prodromal stage.	Painful enlargement of these glands decidedly uncommon.
Circulatory System.	
Temperature very often normal throughout. Rarely exceeds 100° F. (37.8° C.). High temperatures only exceptionally observed. Maximum fever corresponds to development of eruption during first two days and does not necessarily correspond to maximum eruption. The fever rarely endures beyond the third day.	Fever always present, often intense. Maximum fever corresponds with maximum eruption on the sixth day. Defervescence rarely complete before seventh or eighth day.
Eruption.	
Appears on the first, second, or third day, rarely later. Often disappears from parts first invaded before other parts are attacked. It is pale rose-red in color, and only rarely assumes a dusky red. It is usually discrete, sometimes diffuse. In the former case the lesions are papulo-macular and generally circular, and do not tend to form crescentic groups. In the latter cases, they often coalesce by fusion of their borders and form pale red continuous surfaces. These are not, however, universal and are always associated with the discrete rose-colored spots, which are not uniform in size and not always circular, but may be angular and measles-like. The eruption rarely persists beyond the third day and is often completed in forty-eight hours, but may last longer.	The eruption almost always appears on the fourth day, sometimes earlier, sometimes later. The lesions remain in full efflorescence until the maximum is attained, usually during the sixth day, when they begin to fade with the beginning of defervescence. They are papular and tend to form crescentic groups, at least on the face, neck, and upper portions of the trunk. They are mostly of a dark raspberry color and are very irregular in outline. They may coalesce into patches of dusky redness. Rarely the eruption may be pale in color or more circular and discrete.
Faucial Irritation.	
Sore throat is present in nearly all cases, but hardly ever occasions difficulty in deglutition. A punctate, or papular, or diffused eruption appears upon the faucial mucous membrane. This may precede the cutaneous eruption.	Sore throat is uncommon, yet from eighteen to twenty-four hours before the cutaneous eruption appears, there may be seen small, hempseed-sized papules and maculcs scattered over the faucial mucous membrane.

Rötheln.	Measles.
Complications.	
Very unusual; when present, generally involve the respiratory tract.	Very common, generally involving the respiratory tract.
Desquamation.	
But rarely observed and then as almost imperceptible branny scales.	Branny desquamation constant and lasting several days.

Careful consideration of the two diseases shows that while the general points of difference are decided, they will often fail to apply in individual cases. There is no feature of either affection that may not be sometimes observed in the other, whether it belong to the incubative, preëruptive, eruptive, or desquamative stages. This cannot be too much insisted upon, and to disregard it is to expose one's self to almost certain error. The incubative stage of rötheln may be brief, that of measles protracted; the preëruptive stage of the one may be lengthened, that of the other shortened; the catarrh of measles may be insignificant, that of rötheln pronounced; fever may be slight or intense in each disease; in both, the eruption may appear early or late and may run a brief or prolonged course. Departures from typical eruption may be observed in either, and the features supposed to be peculiar to one may, in reality, not seldom appear in the other. The faucial eruptions are not essentially different. Even the adenopathy supposed to be so characteristic of rötheln may be encountered in measles. Finally, desquamation may be absent in measles, it often occurs in rötheln. Klaatsch insists upon, as constant symptoms, conjunctival injection, redness of the fauces, and swelling of the lymph glands; but these symptoms offer no distinguishing characteristics. Are there, then, no peculiar signs upon which a diagnosis may be based with certainty? Considered separately, we must confess that there are none. Taken together, the symptom-complex would enable one to speak with perfect confidence only in presence of the following conditions, viz.: (1) The prevalence of an epidemic in which the history and symptomatology of the disease correspond to a type similar to that laid down in these pages, and (2) the infection of persons exposed to it quite irrespective of previous attacks of measles.

During an epidemic of measles, it must always be unwise to diagnosticate unhesitatingly, as rötheln, a single case in which the course and history of this affection may be observed; for, without doubt, such attacks often follow exposure to measles and communicate measles to others. On the other hand, in an epidemic in which the same course and symptoms are generally observed, and in which all exposed persons are attacked, irrespective of previous attacks of measles, the diagnosis of rötheln may be made with certainty. Between prevailing measles and prevailing rötheln there are differences that usually permit the pathological relationships of given cases to be determined without difficulty.

The symptoms typical of rötheln may also usually be recognized in those who have already experienced an attack of measles, even when occurring sporadically; but of isolated cases, occurring in those who have already had neither measles nor rötheln, one should not venture to speak of more than probability, though in many cases this may be done with some degree of confidence. If one makes the test for rötheln, in a person suffering from a measles-like attack, the fact that he has already had measles, as has been done formerly, and is again being done by some writers, he introduces an unscientific element into the study of the disease that *must* entail disaster. This conclusion appears almost inevitable when we consider that undoubted reinfections with measles are sufficiently known; for although older writers denied that such reinfections occur (Willan never saw them), later observers have shown that they are frequently encountered and that an individual has been known to undergo even a third attack.

Tryanski[1] noted in 200 cases of measles, 14 recurrences with intervals of from six months to seven years, the average being three years. Kassowitz reported reinfections in which the attacks closely resembled rötheln, but could be traced to exposure to measles, and from which measles was communicated to others. Similar experiences have also been reported by many other writers, among whom may be mentioned Hennig[2] and Schwarz[3] (who noted recurrence of measles in eight of sixteen cases, all with the exception of one case having both attacks under his own observation). In a recent epidemic of measles at the "Home of the Friendless," in Baltimore, under the writer's observation, of thirty-one children attacked with measles five had a return of symptoms within six weeks; in each case the second attack was exceedingly mild, presenting features that might perfectly well have justified a diagnosis of rötheln, with this difference, however: of all the children exposed only these five developed the second eruption, a result that would not have been observed had rötheln been the cause of it. These considerations, however, bear only upon the relations of sporadic cases of rötheln. Recurrent measles is uncommon, and is quite unknown as of epidemic occurrence.

There occur, it is true, in epidemics and sporadically, cases resembling measles and yet unlike it, attacking alike those who have had and those who have not had measles, yet in important particulars differing from all of the acute exanthemata as we now understand them.[4] Such cases,

[1] Dorpat med. Zeitschr., 1873, iii.

[2] Arch. f. Kinderh., 1874–76, 8.

[3] Wien. med. Presse, 1876, 43–45.

[4] Cheadle, for example, has described an epidemic affecting many who had already had measles, the symptoms of which were remarkable for their intensity and presented peculiarities unlike those described by nearly all writers upon rötheln. If the patients had not already had measles, one would never have called the affection rötheln. It would even seem more probable that Cheadle treated measles in those who had already had rötheln.

it is said, cannot belong to measles, since those who have already had this affection are not protected. They are of uncommon occurrence, and eventually will probably prove to be bastard forms of measles or scarlatina, or possibly some as yet not understood disorder, or results of the concurrent activity of more than one specific affection; at all events, we are not justified in recognizing them as rötheln until clinical observation has demonstrated them to be such.

Scarlatina differs from rötheln in its shorter incubation, its violently febrile onset, the intensity of the throat symptoms, the peculiar condition of the tongue, the character and longer duration of the eruption and fever, the copious desquamation, and the peculiar complications and sequelæ. Mild cases of scarlatina may be mistaken for rötheln, but the diffused form of eruption in this affection can offer only difficulties, and even here the spread-out red patches always pass at their margins into the easily recognized pale maculo-papules that clear away doubt. Non-specific erythematous affections are so circumscribed, or are so evidently traceable to their exciting cause, that doubt can hardly arise unless the question of idiopathic roseola, epidemic roseola, etc., be raised. The difference here will be rather of words than of meaning, since there is little doubt that this affection and rötheln are identical. Occasionally maculo-papular medicinal rashes have been mistaken for rötheln, and the writer has known the adenopathy and eruption to be looked upon as syphilitic roseola and adenopathy at first.

Treatment.—Very little treatment is ever required; indeed, but few find it necessary to keep in bed or even within doors during the attack. Treatment may be called for when complications arise. Such accidents are rare, but when present must be treated according to their necessities and without special reference to the exanthem. As the contagious properties of rötheln are not pronounced, and as they are soon exhausted, isolation, should it be desirable, need not be as protracted as with scarlatina, smallpox, measles, etc.

Conclusions.—1. Rötheln is a specific, contagious, eruptive disorder.

2. While it possesses pretty well defined characteristics, which, taken together, justify a reasonable degree of certainty in its diagnosis, it has no symptom that may not be and is not often assumed by measles.

3. A sporadic case, occurring in one who has never had measles and who affords no history of exposure to rötheln, may be diagnosticated with a fair degree of confidence, but not with absolute certainty.

4. The unqualified diagnosis of rötheln should only be made during an epidemic in which all persons exposed, irrespective of former attacks of measles, are liable to be affected and in whom the symptoms follow a pretty uniform type. In the absence of a pronounced epidemic influence, a series of cases occurring in a household, a school, or an asylum,

showing typical symptoms, may be diagnosticated as rötheln with a fair degree of confidence.

5. In sporadic cases, where neither measles nor rötheln has been experienced, a diagnosis of probable measles or rötheln must be made, accordingly as the symptoms and course resemble the type of one or the other affection.

A final word of explanation and defence of the title under which this paper appears, is due. Most unfortunately the term *rubeola*, which in Germany, since the time of Hildebrandt, is universally adopted as the classical name for our affection, is to English-speaking races inseparably connected with the conception of measles. This has driven English-speaking writers to have recourse to the German word rötheln. To one unacquainted with the German language, this title is unmeaning, is not euphonious, and is a source of embarrassment. First employed by Werlhof, in 1759, it is now firmly established and definitely understood in Germany. Unable unqualifiedly to adopt "rubeola" and "rötheln," the medical public has hit upon "German measles" as designating the malady in question, and under this name it is becoming generally recognized. Yet this is a most unsatisfactory and unscientific evasion of the real issue, and implies a relationship which is not admitted. I would suggest, therefore, that the title first proposed, I believe by Veale, and afterward by Squire, and adopted in Quain's *Dictionary*, *rubella*, be accepted as the prime name of the affection; and as "German measles" is manifestly a most objectionable designation, I also suggest that the affection be popularly known as "epidemic roseola," a term that has the advantage of age, and that was undoubtedly originally applied to it, though under a different conception of its nature.

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